Data Evaluation Report on the adsorption-desorption of RPA 221701, a degradate of fenamidone, in soil

PMRA Submission Number {......} EPA MRID Number 45930002

Data Requirement: PMRA Data Code:
EPA DP Barcode: D275213
OECD Data Point:
EPA Guideline: 163-1

Test material:
Common name: RPA 221701 (a degradate of fenamidone).
Chemical name
IUPAC: (S)-5-Methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione.
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-, (S)-.
CAS No: Not reported.
Synonyms: S-enantiomer of the racemic compound RPA 410995.
SMILES string:

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Company Code:
Active Code:
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EPA PC Code: 046679

CITATION: Chipping, N.J. and C.M. Burr. 2001. [^{14}C]-RPA 221701 adsorption to and desorption from four soils and a sediment. Unpublished study performed and sponsored by Aventis CropScience UK Ltd, Essex, UK; submitted by Bayer CropScience, Laboratory Project ID: 25112B. Experimental initiation July 25, 2000, and completion December 11, 2000 (p. 6). Final report issued February 15, 2001.

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CONCLUSIONS:

Administrative: This study is acceptable and provides information on the sorption behaviour of the degradate RPA-2217001. Together with batch-equilibrium adsorption/desorption studies conducted with parent fenamidone and other degradates as the test substance, the study conducted with RPA-2217001

Scientific: The degradate RPA-2217001 show high to intermediate mobility depending on the soil. Adsorption was essentially linear within the experimental range of concentratrion. Considerable hysteresis was observed between the adsoption and desorption isotherms.

EXECUTIVE SUMMARY:

The adsorption/desorption characteristics of [phenyl-U-^{14}C](S)-5-methyl-3-(2-nitrophenyl-amino)-5-phenylimidazolidine-2,4-dione (RPA 221701) were studied in a silt loam soil [96/19 soil; pH 6.2, organic carbon 0.5%] and a sandy loam soil [98/32 soil; pH 4.8, organic carbon 1.2%], each from the U.S., and a loam soil [98/26 soil; pH 7.0, organic carbon 1.9%], a silt loam soil [97/10 soil; pH 8.1, organic carbon 1.9%], and a clay sediment [97/17 sediment; pH 7.4, organic carbon 3.4%], each from the UK, in a batch equilibrium experiment. The experiment was conducted in accordance with the U.S.EPA Pesticide Assessment Guidelines, Subdivision N, Section 163-1, and in compliance with the OECD GLP. The adsorption phase of the study was carried out by equilibrating air-dried soil with [^{14}C]RPA 221701 at nominal concentrations of 0.1, 0.4, 2.0, and 11.0 mg a.i/kg soil in the dark at 20 ± 1°C for 24 hours. The equilibrating solution used was 0.01M $CaCl_2$, with soil/solution ratios of 1:5 (w:v) for all soils. The desorption phase of the study was carried out by replacing the adsorption solution with an equivalent volume of pesticide-free 0.01M $CaCl_2$ solution and equilibrating in the dark for 1 hour at 20°C. The desorption step was conducted a total of five times.

The supernatant solution after adsorption, desorption, and extraction was separated by centrifugation, decanted and aliquots were analyzed for total radioactivity using LSC. Following desorption and extraction, the soils were combusted and analyzed for total radioactivity using LSC. High-dose supernatant samples were analyzed using HPLC.

[^{14}C]RPA 221701 showed some degradation in the silt loam 97/10 soil, clay sediment, and loam soil. In the silt loam 97/10 soil, degradation was 7.8% of the applied during the adsorption phase, 2.56% during the first desorption step, and <1% during the second desorption step. In the clay sediment, degradation was 3.3% in the adsorption phase, 1.9% in the first desorption step, and <1% in the second desorption step. In the loam soil, degradation was <0.5% in the desorption phase. [^{14}C]RPA 221701 did not degrade in the silt loam 96/19 soil or sandy loam soil during the study. The mass balance at the end of the adsorption phase of the study was not reported. Mass balances at the end of the desorption phase (fifth desorption step) were 91.69-99.98%, 93.19-101.08%, 91.34-103.65%, 93.34-99.30%, and 92.54-99.31% of the applied for the silt loam 96/19, loam, silt loam 97/10, clay sediment, and sandy loam soils, respectively.

After 24 hours of equilibration, 19.6-27.4%, 45.9-61.7%, 23.8-41.6%, 45.7-60.1%, and 31.3-40.3% of the applied [^{14}C]RPA 221701 was adsorbed to the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively. Adsorption K_d values were 1.5363, 6.6045, 3.2271, 5.6634, and 2.8934 for the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively; corresponding K_{oc} values were 266, 238, 101, 141, and 201. At the end of the desorption phase, 83.0-91.1%, 67.8-81.1%, 72.3-86.1%, 77.9-81.1%, and 82.0-88.2% of the applied ^{14}C was desorbed from the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively. Desorption K_d values were 402.76, 21.28, 13.21, 30.36, and 113.58 for the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively; corresponding K_{oc} values were 80551, 1120, 695, 893, and 9465.

$$Kd = \frac{\left[\frac{(C_0V_0 - C_{eq}V_0)}{m}\right]}{C_{eq}}$$

The reviewer-calculated r^2 value for the relationship of Kd vs. % organic carbon is 0.5578, for Kd vs. pH is 0.1579, and for Kd vs. % clay is 0.5483. Desorption K and K_{oc} values were higher than those obtained for adsorption.

Results Synopsis: The reviewer calculated adsorption K_d values using the following equation:

Soil type: Silt loam 96/19
Amount adsorbed: 19.6-27.4% of the applied
Adsorption K_d: 1.5363
Adsorption K_{oc}: 266
Amount desorbed: 83.0-91.1% of the adsorbed
Desorption K_d: 402.76
Desorption K_{oc}: 80,551

Soil type: Loam 98/26
Amount adsorbed: 45.9-61.7% of the applied
Adsorption K_d: 6.6045
Adsorption K_{oc}: 238
Amount desorbed: 67.8-81.1% of the adsorbed
Desorption K_d: 21.28
Desorption K_{oc}: 1,120

Soil type: Silt loam 97/10
Amount adsorbed: 23.8-41.6% of the applied
Adsorption K_d: 3.2271
Adsorption K_{oc}: 101
Amount desorbed: 72.3-86.1% of the adsorbed
Desorption K_d: 13.21
Desorption K_{oc}: 695

Soil type: Clay 97/17
Amount adsorbed: 45.7-60.1% of the applied
Adsorption K_d: 5.6634
Adsorption K_{oc}: 141
Amount desorbed: 77.9-81.1% of the adsorbed
Desorption K_d: 30.36
Desorption K_{oc}: 893

Soil type: Sandy loam 98/32
Amount adsorbed: 31.3-40.3% of the applied
Adsorption K_d: 2.8934
Adsorption K_{oc}: 201
Amount desorbed: 82.0-88.2% of the adsorbed
Desorption K_d: 113.58
Desorption K_{oc}: 9,465

The reviewer-calculated adsorption K_d values were slightly higher than those calculated by the study authors.

Results Synopsis: The study authors calculated adsorption K values using the following Freundlich isotherm equation: $C_{s1} = K_F \times C_{w1}^{(1/n)}$.

Soil type: Silt loam 96/19
Amount adsorbed: 19.6-27.4% of the applied
Freundlich K_{ads}: 1.33
Freundlich adsorption K_{oc}: 266
Amount desorbed: 83.0-91.1% of the adsorbed
Freundlich K_{des}: 402.76
Freundlich desorption K_{oc}: 80,551

Soil type: Loam 98/26
Amount adsorbed: 45.9-61.7% of the applied
Freundlich K_{ads}: 4.52

Freundlich adsorption K_{oc}: 238
Amount desorbed: 67.8-81.1% of the adsorbed
Freundlich K_{des}: 21.28
Freundlich desorption K_{oc}: 1,120

Soil type: Silt loam 97/10
Amount adsorbed: 23.8-41.6% of the applied
Freundlich K_{ads}: 1.92
Freundlich adsorption K_{oc}: 101
Amount desorbed: 72.3-86.1% of the adsorbed
Freundlich K_{des}: 13.21
Freundlich desorption K_{oc}: 695

Soil type: Clay 97/17
Amount adsorbed: 45.7-60.1% of the applied
Freundlich K_{ads}: 4.81
Freundlich adsorption K_{oc}: 141
Amount desorbed: 77.9-81.1% of the adsorbed
Freundlich K_{des}: 30.36
Freundlich desorption K_{oc}: 893

Soil type: Sandy loam 98/32
Amount adsorbed: 31.3-40.3% of the applied
Freundlich K_{ads}: 2.41
Freundlich adsorption K_{oc}: 201
Amount desorbed: 82.0-88.2% of the adsorbed
Freundlich K_{des}: 113.58
Freundlich desorption K_{oc}: 9,465

For the four test soils and sediment, adsorption of RPA 221701 was not fully reversible, with hysteresis in the adsorption/desorption curve. Desorption K values increased with each desorption step.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study was conducted according to U.S. EPA Pesticide Assessment Guidelines Subdivision N, Series §163-1 (October 1982) and the EU Commission Directive 95/36/EC (July 1995; p. 15). A significant deviation from Subdivision N §163-1 guidelines was:

The study was conducted using a degradate of fenamidone rather than the parent compound. This does not affect the validity of the study.

COMPLIANCE: The study was conducted in compliance with OECD Good Laboratory Practice Standards (1999; p. 3). Signed and dated No Data Confidentiality, GLP, Quality Assurance, and Certificate of Authenticity statements were provided (pp. 2-5).

A. MATERIALS:

1. Test Material [Phenyl-U-^{14}C](S)-5-methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione (RPA 221701; p. 15).

Chemical Structure: See DER Attachment 2.

Description: Not provided. It was only stated that the test material was supplied in acetonitrile (p. 16).

Purity:

Radiolabelled: Analytical purity: Not reported.
Radiochemical purity: 100% (p. 16; Appendix 1, pp. 75-77).
Batch No. DCR6/2 (p. 15).
Specific activity: 1175 Mbq/mmol (p. 16).
Location of the label: Uniformly labeled in the phenyl ring.

Non-radiolabelled: Analytical purity: 99.0% (Table 25, p. 49)
Batch No. PHDS862.

Storage conditions of test chemicals: Not reported.

Physico-chemical properties of RPA 221701:

Parameter	Values	Comments
Water solubility	4.43 mg/L.	
Vapour pressure	Not reported.	
UV absorption	Not reported.	
Molecular Formula	$C_{16}H_{14}N_4O_4$	
Molecular Weight	326.3 g/mole	
Melting point	Not reported.	
Bulk density	Not reported.	
pK_a	Not reported	
K_{ow}	Not reported	
Stability of Compound at room temperature	Not reported	

Data were obtained from pp. 14-15 and Appendix 3, pp. 80-81 of the study report.

2. Soil Characteristics

Table 1: Description of soil collection and storage.

Description	Silt loam 96/19	Loam 98/26	Silt loam 97/10	Clay 97/17	Sandy loam 98/32
Geographic location	Delta Research Farm, Leland, MS	Boarded Barns Farm, Ongar, Essex, UK	Adisham Court Farm, Canterbury, Kent, UK	Boarded Barns Farm, Ongar, Essex, UK	Hill Top Farm, Iola, WI
Pesticide use history at the collection site	Not reported	Not reported	Not reported	Not reported	Not reported
Collection procedures	Not reported	Not reported	Not reported	Not reported	Not reported
Sampling depth (cm)	Not reported	Not reported	Not reported	Not reported	Not reported
Storage conditions	Not reported	Not reported	Not reported	Not reported	Not reported
Storage length	Not reported	Not reported	Not reported	Not reported	Not reported

Description	Silt loam 96/19	Loam 98/26	Silt loam 97/10	Clay 97/17	Sandy loam 98/32
Soil preparation	Air-dried; sieved, 2 mm.	Air-dried; sieved, 2 mm.	Air-dried; sieved, 2 mm.	Partially air-dried; sieved, 2 mm.	Air-dried; sieved, 2 mm.

Data were obtained from p. 16; Table 1, p. 30; Appendix 8, pp. 106-109 of the study report.

Table 2: Properties of the soils.

Property	96/19	98/26	97/10	97/17	98/32
Soil Texture	Silt loam	Loam	Silt loam	Clay	Sandy loam
% sand	35.80	33.38	20.90	20.03	66.99
% silt	55.97	41.50	54.79	36.49	26.66
% clay	8.23	25.12	24.31	43.49	6.35
pH Water 0.01M $CaCl_2$ 1M KCl	 6.2 5.1 4.8	 7.0 6.4 6.7	 8.1 7.5 7.7	 7.4 7.5 7.7	 4.8 4.2 3.8
Organic carbon (%)	0.5	1.9	1.9	3.4	1.2
Organic matter (%)	0.9	3.3	3.3	5.9	2.1
CEC (meq/100 g)	5.7	10.0	65.7	62.3	17.0
Moisture at 1/3 atm (%)	25.41	20.70	25.86	31.25	12.80
Bulk density (g/mL)	Not reported	Not reported	Not reported	Not reported	Not reported
Biomass (mg microbial C/100 g or CFU or other)	Not reported	Not reported	Not reported	Not reported	Not reported
Soil taxonomic classification[1]	Fine-loamy, Mixed, Thermic Mollic Hapludalfs.	Fine-loamy, Mixed, Mesic Typic Hapludalfs.	Fine-silty, Mixed, Mesic Typic Eutrochrept.	Not reported.	Coarse-loamy, Mixed Typic Glossoboralfs.
Sol mapping unit (for EPA)	Not reported	Not reported	Not reported	Not reported	Not reported

Data were obtained from Table 1, p. 30 and Appendix 8, pp. 106-109 of the study report.

C. STUDY DESIGN:

1. Preliminary study:

To determine the solubility of RPA 221701, approximately 0.5 mg of RPA 221701 (0.125 mL of stock solution) of [^{14}C]RPA 221701, dissolved in acetonitrile, was weighed into a "suitable container" and 20 mL of deionized water was added to the flask (Appendix 3, p. 80). The solution was mixed in an ultrasonic bath for approximately 24 hours at 20°C, then filtered through two 0.1-µm filters. The solubility of RPA 221701 was determined by HPLC on a calibration curve using a series of different test concentrations of unlabeled RPA 221701. The solubility of RPA 221701 was determined to be 4.43 mg/L (p. 16; Appendix 3, p. 81).

Additional preliminary experiments were conducted to determine: (i) adsorption of the test substance to the test vessels; (ii) the equilibration time and soil:solution ratio to be used in the definitive study; and (iii) the stability of the test substance under the equilibrium conditions.

To determine whether the test substance adsorbed to glass tubes, 75 mL of a solution containing 0.09 mg/L of [^{14}C]RPA 221701 in 0.01M $CaCl_2$ solution were added to two borosilicate screw-capped glass tubes externally coated with plastic, and the tubes were tightly capped and shaken on an end-over-end shaker in the dark at 20 ± 1°C for 24 hours (p. 17). Aliquots of the solutions were analyzed for total radioactivity using LSC. Results showed that RPA 221701 did not adsorb to the glass tubes; the mean recovery was 98.93% (98.46-99.40%; p. 24; Table 3, p. 31).

To determine the soil:solution ratio to be used in the definitive study, soil:solution ratios of 1:20, 1:10 and 1:5 (w:v) were prepared by adding aliquots of a solution containing 0.09 mg/L of [^{14}C]RPA 221701 in 0.01M $CaCl_2$ solution to borosilicate screw-capped glass tubes containing 3, 6, and 15 g (oven dried equivalent weight) of each test soil and sediment (p. 17). The tubes were tightly capped, shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 1°C for 24 hours. The tubes were removed and the samples were centrifuged for 10 minutes at 830 rcf (relative centrifuge force). Aliquots of the supernatants were analyzed for total radioactivity using LSC. Soil:solution ratios of 1:5 (w:v) yielded recoveries of 44.71-77.71% of the applied in the supernatants (Table 4, p. 32). Soil:solution ratios of 1:10 and 1:20 (w:v) yielded recoveries of 64.14-87.84% and 78.14-93.26% of the applied, respectively, in the supernatants.

To determine the equilibration time to be used in the definitive adsorption phase of the study, 75 mL of a 0.01M $CaCl_2$ solution containing [^{14}C]RPA 221701 were added to borosilicate screw-capped glass tubes containing eight portions, weighing 15 g (oven dried equivalent weight), of each test soil and sediment (pp. 18-19). The tubes were shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 1° C for 1, 2, 4, 6, 24, and 48 hours. The samples were centrifuged at 830 rcf for 10 minutes and triplicate aliquots of the supernatants were analyzed for total radioactivity using LSC. Results showed an initial, rapid decrease in radioactivity in the supernatants, that was followed by a gradual decrease with little change after 24 hours (p. 24; Figure 1, p. 50).

To determine the equilibration time to be used in the definitive desorption phase of the study, 75 mL of a 0.01M $CaCl_2$ solution containing [^{14}C]RPA 221701 were added to borosilicate screw-capped glass tubes containing eight portions weighing 15 g (oven dried equivalent weight) of each test soil and sediment (pp. 19-20). The tubes were tightly capped, shaken by hand to suspend the soil, then shaken on an end-over-end shaker in the dark at 20 ± 1° C for 24 hours. The samples were centrifuged at 830 rcf for 10 minutes, and the supernatants were decanted and replaced with pesticide-free 0.01M $CaCl_2$. The tubes were then placed in the dark at 20°C and shaken on an end-over-end shaker for 1, 2, 4, 6, 24, and 48 hours (p. 20). The samples were centrifuged at 830 rpm for 10 minutes and triplicate aliquots of the supernatants were analyzed for total radioactivity using LSC. In the four test soils and one sediment, the amount of radioactivity in solution was similar between 1 hour and 24 hours (p. 24; Figure 2, p. 51).

Based on the results of the preliminary studies, it was determined that a soil:solution ratio of 1:5 (w:v), an adsorption equilibration time of 24 hours, and a desorption time of 1 hour would be used for all test soils in the definitive study (p. 24). A maximum test concentration of 2.2 mg/L (50% of the aqueous solubility) was selected for use in the definitive study, as recommended in the OECD guidelines (p. 16). It was also concluded that since [^{14}C]RPA 221701 did not adsorb to the test tubes, further preparation of the test tubes for use in the definitive study was not required.

2. Definitive study experimental conditions:

Table 3: Study design for the adsorption phase.

Parameters	**Silt loam 96/19**	**Loam 98/26**	**Silt loam 97/10**	**Clay 97/17**	**Sandy loam 98/32**
Condition of soil (air dried/fresh)	Air-dried	Air-dried	Air-dried	Partially air-dried	Air-dried
Have these soils been used for other laboratory studies ? (specify which)	Yes, MRID 45930003	Yes, MRID 45930003	Yes, MRID 45930003	No	Yes, MRID 45930003
Soil (g/replicate)	15	15	15	15	15
Equilibrium solution used (name and concentration; eg: 0.01N $CaCl_2$)	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$
Control used (with salt solution only) (Yes/No)	No	No	No	No	No

Parameters		**Silt loam 96/19**	**Loam 98/26**	**Silt loam 97/10**	**Clay 97/17**	**Sandy loam 98/32**
Test material concentrations[1]	Nominal application rates (mg a.i./kg soil)	0.1, 0.4, 2.0, 11.0	0.1, 0.4, 2.0, 11.0	0.1, 0.4, 2.0, 11.0	0.1, 0.4, 2.0, 11.0	0.1, 0.4, 2.0, 11.0
	Analytically measured concentrations (mg a.i./kg soil)	0.096, 0.349, 2.312, 11.344	0.096, 0.349, 2.312, 11.344	0.096, 0.349, 2.312, 11.344	0.096, 0.349, 2.312, 11.344	0.096, 0.349, 2.312, 11.344
Identity and concentration of co-solvent, if any		Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.	Acetonitrile, concentration not reported.
Soil:solution ratio		1:5	1:5	1:5	1:5	1:5
Initial pH of the equilibration solution, if provided		Not reported	Not reported	Not reported	Not reported	Not reported
No. of replications	Controls	0	0	0	0	0
	Treatments	2	2	2	2	2
Equilibration	Time (hours)	24	24	24	24	24
	Temperature (°C)	20 ± 1	20 ± 1	20 ± 1	20 ± 1	20 ± 1
	Darkness	Yes	Yes	Yes	Yes	Yes
	Shaking method	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker
	Shaking time (hours)	24	24	24	24	24
Method of separation of supernatant (eg., centrifugation)		Centrifugation	Centrifugation	Centrifugation	Centrifugation	Centrifugation
Centrifugation	Speed (rcf)	830	830	830	830	830
	Duration (min)	10	10	10	10	10
	Method of separation of soil and solution	Decanted	Decanted	Decanted	Decanted	Decanted

Data were obtained from pp. 16, 21 and Table 5, p. 32 of the study report.

[1] Test material concentrations were calculated by the reviewer as follows: [nominal test concentration (mg/L) x total volume of test material solution (mL)] ÷ amount of soil (g); eg. [0.02 mg/L x 75 mL) ÷ 15.0 g = 0.1 mg a.i./kg soil.

rcf = relative centrifuge force.

Table 4: Study design for the desorption phase.

Parameters		**Silt loam 96/19**	**Loam 98/26**	**Silt loam 97/10**	**Clay 97/17**	**Sandy loam 98/32**
Were the soil residues from the adsorption phase used? If not, describe the method for adsorption using a separate adsorption Table		Yes	Yes	Yes	Yes	Yes
Amount of test material present in the adsorbed state/ad-sorbed amount (mg a.i./kg soil)	0.1	0.0232	0.0580	0.0416	0.0516	0.0362
	0.4	0.0784	0.2011	0.1316	0.1828	0.1253
	2.0	0.5482	1.2337	0.8163	1.2011	0.8062
	11.0	2.1847	5.0455	2.6191	5.3235	3.4475
No. of desorption cycles		5	5	5	5	5
Equilibration solution and quantity used per treatment for desorption (eg., 0.01M $CaCl_2$)		0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$	0.01M $CaCl_2$
Soil:solution ratio		1:5	1:5	1:5	1:5	1:5
Replications	Controls	0	0	0	0	0
	Treatments	2	2	2	2	2
Desorption equilibration	Time (hours)	1	1	1	1	1
	Temperature (°C)	20	20	20	20	20
	Darkness	Yes	Yes	Yes	Yes	Yes
	Shaking method	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker	End-over-end shaker
	Shaking time (hours)	1	1	1	1	1
Centrifugation	Speed (rcf)	830	830	830	830	830
	Duration (min)	10	10	10	10	10
	Method of separation of soil and solution	Decanted	Decanted	Decanted	Decanted	Decanted

Parameters		Silt loam 96/19	Loam 98/26	Silt loam 97/10	Clay 97/17	Sandy loam 98/32
Second through fifth desorption	Indicate if the method is the same as the first desorption cycle	Same	Same	Same	Same	Same

Data were obtained from p. 21; Tables 8-12, pp. 34-35; and Appendices 5-7, pp. 83-105 of the study report.
rcf = relative centrifuge force.

3. Description of analytical procedures:

Extraction/clean up/concentration methods: Following the final desorption step, 75 mL of acetonitrile were added to two tubes of each test soil and sediment, and the tubes were weighed and shaken to resuspend the soil (p. 21). The tubes were shaken on a wrist action shaker for 20 minutes, reweighed, then the samples were centrifuged at approximately 830 rcf (relative centrifuge force) for 10 minutes, and the supernatants were removed (method unspecified). The tubes and soil pellets were weighed so that the weight of the supernatants could be calculated. Aliquots of the supernatants were analyzed for total radioactivity using LSC.

Total ^{14}C measurement: Following adsorption, desorption and extraction, aliquots of the supernatants were analyzed for total radioactivity using LSC (pp. 20-21). Following the final desorption or extraction, the soil residues were air-dried, weighed, and ground to a fine powder. Triplicate subsamples (0.1-0.3 g) were analyzed for total radioactivity using LSC following combustion. Combustion efficiency was not reported.

Non-extractable residues, if any: Not applicable.

Derivatization method, if used: A derivatization method was not employed in the study.

Identification and quantification of parent compound: Following adsorption and desorption, duplicate aliquots of the high-dose supernatant samples were analyzed by HPLC (p. 22). Identification and quantification of RPA 221701 were performed by HPLC using the following operating conditions: Kromasil KR100 5C1 column (4.6 mm × 250 mm; particle size not reported), isocratic mobile of acetonitrile:water (60:40, v:v), flow rate 1 mL/minute, with radiometric and UV (230 nm) detection. The identity of RPA 221701 was confirmed by chromatographic comparison of the HPLC retention time of an unlabelled RPA 221701 reference standard.

Identification and quantification of transformation products, if appropriate: Samples were not analyzed for transformation products of RPA 221701.

Detection limits (LOD, LOQ) for the parent compound: The limit of detection for LSC analysis of RPA 221701 was reported to be 0.0370 ng/g (p. 22; Appendix 9, p. 110). The limit of detection for HPLC analysis of RPA 221701 was reported to be 0.00342 µg/g. The limits of quantification for LSC and HPLC analysis was not reported.

Detection limits (LOD, LOQ) for the transformation products: Samples were not analyzed for transformation products of RPA 221701.

II. RESULTS AND DISCUSSION

A. TEST CONDITIONS: [^{14}C]RPA 221701 showed some degradation in the silt loam 97/10 soil, clay sediment, and loam soil. In the silt loam 97/10 soil, degradation was 7.8% of the applied during the adsorption phase, 2.56% during the first desorption step, and <1% during the second desorption step (p. 27; Table 18, p. 46). In the clay sediment, degradation was 3.3% in the adsorption phase, 1.9% in the first desorption step, and <1% in the second desorption step. In the loam soil, degradation was <0.5% in the desorption phase. [^{14}C]RPA 221701 did not degrade in the silt loam 96/19 soil or the sandy loam soil during the study. It was stated that the temperature was maintained at 20 ± 1°C throughout the study; however, temperature records were not provided. The pH of the test solutions were not reported.

B. MASS BALANCE: The mass balance at the end of the adsorption phase of the study was not reported. Mass balances were calculated by summing the total amount of RPA 221701 recovered in the adsorption and desorption solutions, the soil extracts, and unextracted soil residues. Mass balances at the end of fifth desorption step were 91.69-99.98%, 93.19-101.08%, 91.34-103.65%, 93.34-99.30%, and 92.54-99.31% of the applied for the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively (Tables 19-23, pp. 47-48).

Table 5: Recovery of [^{14}C]RPA 221701, expressed as percentage of applied radioactivity, in soil after adsorption/desorption (mean ± s.d.).

Matrices	Silt loam 96/19	Loam 98/26	Silt loam 97/10	Clay 97/17	Sandy loam 98/32
At the end of the adsorption phase					
Supernatant solution	70.5 ± 2.3	39.3 ± 5.9	56.6 ± 7.6	40.5 ± 2.6	59.4 ± 2.6
Solid phase (total ^{14}C)	Not analyzed.				
Non-extractable residues in soil, if measured	Not measured.				
Total recovery	Not reported.				
At the end of the desorption phase					
Supernatant solution (Desorption 1)	15.4 ± 0.8	19.5 ± 0.9	18.6 ± 0.6	20.8 ± 0.6	19.0 ± 0.8
Supernatant solution (Desorption 2)	4.3 ± 0.7	10.6 ± 0.5	7.2 ± 1.0	11.1 ± 0.6	7.1 ± 0.8
Supernatant solution (Desorption 3)	1.7 ± 0.4	6.2 ± 0.6	3.4 ± 0.7	6.4 ± 0.6	3.2 ± 0.5
Supernatant solution (Desorption 4)	0.9 ± 0.2	2.9 ± 1.7	1.8 ± 0.5	4.0 ± 0.4	1.6 ± 0.3
Supernatant solution (Desorption 5)	0.5 ± 0.2	3.1 ± 1.0	1.2 ± 0.4	2.6 ± 0.3	1.0 ± 0.2
Solid phase (extracted)[1]	1.0 ± 0.0	6.5 ± 1.0	1.9 ± 0.1	7.4 ± 0.1	2.5 ± 0.0
Non-extractable residues in soil, if measured	3.3 ± 1.8	14.0 ± 7.5	8.2 ± 4.5	9.9 ± 4.4	5.4 ± 2.7
Total recovery	96.9 ± 3.2	97.3 ± 2.5	97.5 ± 4.0	97.1 ± 2.4	97.3 ± 2.2

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

[1] All soils were extracted prior to combustion.

Table 6: Concentration of [^{14}C]RPA 221701 in the solid and liquid phases at the end of adsorption equilibration period (mean ± s.d.).

Concen-tration (mg a.i./kg soil)	Silt loam 96/19			Loam 98/26			Silt loam 97/10		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]
0.1	0.0232 ± 0.0	0.0144 ± 0.0	23.2± 1.1	0.0580 ± 0.0	0.0073 ± 0.0	58.0 ± 1.0	0.0416 ± 0.0	0.0102 ± 0.0	41.6 ± 1.3
0.4	0.0784 ± 0.0	0.0534 ± 0.0	19.6 ± 0.0	0.2011 ± 0.0	0.0277 ± 0.0	50.3 ± 1.0	0.1316 ± 0.0	0.0411 ± 0.0	32.9 ± 0.1
2.0	0.5482 ± 0.0	0.3464 ± 0.0	27.4 ± 0.1	1.2337 ± 0.0	0.2050 ± 0.0	61.7 ± 1.3	0.8163 ± 0.0	0.2808 ± 0.0	40.8 ± 0.3
11.0	2.1847 ± 0.0	1.8125 ± 0.0	19.9 ± 0.3	5.0455 ± 0.1	1.2190 ± 0.0	45.9 ± 1.2	2.6191 ± 0.4	1.6700 ± 0.1	23.8 ± 3.6

Concentration (mg a.i./kg soil)	Clay 97/17			Sandy loam 98/32		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% adsorbed[2]
0.1	0.0516 ± 0.0	0.0085 ± 0.0	51.6 ± 0.1	0.0362 ± 0.0	0.0117 ± 0.0	36.2 ± 0.0
0.4	0.1828 ± 0.0	0.0322 ± 0.0	45.7 ± 0.3	0.1253 ± 0.0	0.0439 ± 0.0	31.3 ± 0.2
2.0	1.2011 ± 0.0	0.2133 ± 0.0	60.1 ± 0.4	0.8062 ± 0.0	0.2896 ± 0.0	40.3 ± 0.5
11.0	5.3235 ± 0.1	1.1691 ± 0.0	48.4 ± 0.5	3.4475 ± 0.0	1.5310 ± 0.0	31.3 ± 0.4

Data were obtained from Tables 8-12, pp. 34-35 and Appendices 5-7, pp. 83-105 of the study report.

[1] The concentration remaining on the soil was calculated by the study authors as the difference between the amount of RPA 221701 in the tube at the start of the cycle and the total amount in the aqueous phase (p. 24). An allowance was made for the residual water remaining on the soil pellet following centrifugation.

[2] Percent adsorbed was calculated by the reviewer as follows: [concentration on soil (mg a.i./kg) ÷ nominal test concentration (mg a.i./kg)] x 100%; [eg. 0.02241

mg a.i./kg ÷ 0.1 mg a.i./kg] x 100% = 22.41%.

Table 7: Concentration of [^{14}C]RPA 221701 in the solid and liquid phases at the end of desorption (n=5).

Concentration (mg a.i./kg soil)	Silt loam 96/19			Loam 98/26			Silt loam 97/10		
	on soil (mg a.i./kg)[1]	in solution (µg	% desorbed as %	on soil (mg a.i./kg)[1]	in solution (µg	% desorbed as %	on soil (mg a.i./kg)[1]	in solution (µg	% desorbed as %
0.1	0.0056 ± 0.0	0.0001 ± 0.0	83.0 ± 0.7	0.0209 ± 0.0	0.0006 ± 0.0	67.8 ± 0.1	0.0150 ± 0.0	0.0003 ± 0.0	72.3 ± 0.9
0.4	0.0160	0.0005 ±	84.6 ±	0.0718	0.0032	68.3 ±	0.0369	0.0010	76.3 ±
2.0	0.2246	0.0022 ±	89.8 ±	0.4083	0.0114	77.4 ±	0.3067	0.0044	83.6 ±
11.0	0.6151 ± 0.0	0.0070 ± 0.0	91.1 ± 0.1	1.1004 ± 0.1	0.0482 ± 0.0	81.1 ± 1.7	0.3597 ± 0.04	0.0149 ± 0.0	86.1 ± 0.0

Concentration (mg a.i./kg soil)	Clay 97/17			Sandy loam 98/32		
	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% desorbed as % of the adsorbed[2]	on soil (mg a.i./kg)[1]	in solution (µg a.i./mL)	% desorbed as % of the adsorbed[2]
0.1	0.0140 ± 0.0	0.0006 ± 0.0	77.9 ± 0.2	0.0082 ± 0.0	0.0003 ± 0.0	82.6 ± 0.3
0.4	0.0463 ± 0.0	0.0020 ± 0.0	78.5 ± 0.5	0.0258 ± 0.0	0.0008 ± 0.0	83.9 ± 0.3
2.0	0.3829 ± 0.0	0.0115 ± 0.0	80.1 ± 0.5	0.2613 ± 0.0	0.0040 ± 0.0	82.0 ± 6.1
11.0	1.2637 ± 0.1	0.0519 ± 0.0	81.1 ± 0.2	0.7909 ± 0.0	0.0156 ± 0.0	88.2 ± 0.2

Data were obtained from Tables 13-17, pp. 36-45; Tables 19-23, pp. 47-48; and Appendices 5-7, pp. 83-105 of the study report.

[1] The concentration remaining on the soil was calculated by the study authors as the difference between the amount of RPA 221701 in the tube at the start of the cycle and the total amount in the aqueous phase (p. 26). An allowance was made for the residual water remaining on the soil pellet following centrifugation.

[2] Percent desorbed as % of the adsorbed was calculated by the reviewer as follows: [% desorbed (Desorption 1+2+3+4+5) ÷ (% total recovery - % adsorbed)] x 100; e.g. [(16.04% + 4.95% + 2.1% + 1.07% + 0.75%) ÷ (98.72% - 68.54%)] x 100 = 82.5%.

Table 8: Adsorption and desorption constants of [^{14}C]RPA 221701 in the soils.

Soil	Adsorption[1,2]				Desorption			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 96/19	1.5363	0.952	0.998	266	402.76	1.280	0.981	80,551
Loam 98/26	6.6045	0.874	0.999	238	21.28	0.931	0.992	1,120
Silt loam 97/10	3.2271	0.827	0.995	101	13.21	0.829	0.881	695
Clay 97/17	5.6634	0.948	0.999	141	30.36	1.031	0.994	893
Sandy loam 98/32	2.8934	0.940	0.999	201	113.58	1.154	0.989	9,465

Data were obtained from p. 21; Table 5, p. 32; Tables 6-7, p. 33; Tables 8-12, pp. 34-35; and Appendices 5-7, pp. 83-105 of the study report.
K_d -Adsorption and desorption coefficients; K - Freundlich adsorption and desorption coefficients; 1/N -Slope of Freundlich adsorption/desorption isotherms.
K_{oc} - Coefficient adsorption per organic carbon (K_d or K x 100/% organic carbon).
R^2 - Regression coefficient of Freundlich equation.
[1] Adsorption K values were reviewer-calculated using the following equation:

$$Kd = \frac{\left[\frac{(C_0V_0 - C_{eq}V_0)}{m}\right]}{C_{eq}}$$

where
S = the sorbed phase concentration with units of mass of sorbate per solid sorbent mass;
C_0 = the concentration in the water before sorption;
V_0 = the total water volume in the batch system;
C_{eq} = the aqueous-phase equilibrium concentration; and
m = the dry mass of sorbent.
[2] Freundlich K_{ads} values calculated by the study authors were 1.33, 4.52, 1.92, 4.81, and 2.41 for the silt loam 96/19, loam 98/26, silt loam 97/10, clay 97/17, and sandy loam 98/32 soils, respectively (see Reviewer's Comment #1).

C. ADSORPTION: After 24 hours of equilibration, 19.6-27.4%, 45.9-61.7%, 23.8-41.6%, 45.7-60.1%, and 31.3-40.3% of the applied [^{14}C]RPA 221701 was adsorbed to the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively (Tables 8-12, pp. 34-35). Adsorption K_d values were 1.5363, 6.6045, 3.2271, 5.6634, and 2.8934 for the silt loam 96/19 soil, loam soil, silt loam soil, clay sediment, and sandy loam soil, respectively; corresponding K_{oc} values were 266, 238, 101, 141, and 201 (Table 6, p. 33).

D. DESORPTION: At the end of the desorption phase (fifth desorption step), 83.0-91.1%, 67.8-81.1%, 72.3-86.1%, 77.9-81.1%, and 82.0-88.2% of the applied [^{14}C]RPA 221701 was desorbed from the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam 98/32 soil, respectively (Tables 19-23, pp. 47-48). Desorption K_d values were 402.76, 21.28, 13.21, 30.36, and 113.58 for the silt loam 96/19 soil, loam soil, silt loam 97/10 soil, clay sediment, and sandy loam soil, respectively; corresponding K_{oc} values were 80551, 1120, 695, 893, and 9465 (Table 7, p. 33).

III. STUDY DEFICIENCIES: The objective of this study was to study the sorptive behaviour of the fenamidone metabolite RPA 221701 in four soils and one sediment with varying soil characteristics. None of the study deficiencies noted are considered to be of sufficient concern to cause the study to be judged scientifically invalid. However, since a metabolite of fenamidone was studied rather than the parent compound parent compound, this study cannot be used to fulfill Subdivision N Guideline §163-1. This study does aid in understanding the overall environmental fate of fenamidone.

IV. REVIEWER'S COMMENTS:

1. The study authors calculated adsorption K values using the Freundlich isotherm equation (p. 25):

$$C_{s1} = K_F \times C_{w1}^{(1/n)}$$

where
K_F = Freundlich adsorption coefficient at equilibrium;
C_{w1} = concentration of adsorption solution at equilibrium;
C_{s1} = concentration in soil at equilibrium; and
$1/n$ = constant.

The study authors calculated desorption K values using the following Freundlich equation (p. 26):

$$C_{sx} = K_{des} \times C_{wx}^{(1/n)}$$

where
C_{sx} = concentration adsorbed to soil at equilibrium;
C_{wx} = concentration in solution at equilibrium; and
$1/n$ = constant.

Freundlich adsorption and desorption constants of [^{14}C]RPA 221701 in the soils.

Soil	Adsorption				Desorption[1]			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 96/19	1.33	0.952	0.998	266	402.76	1.280	0.981	80,551
Loam 98/26	4.52	0.874	0.999	238	21.28	0.931	0.992	1,120

Soil	Adsorption				Desorption[1]			
	K	1/N	R^2	K_{oc}	K	1/N	R^2	K_{oc}
Silt loam 97/10	1.92	0.827	0.995	101	13.21	0.829	0.881	695
Clay 97/17	4.81	0.948	0.999	141	30.36	1.031	0.994	893
Sandy loam 98/32	2.41	0.940	0.999	201	113.58	1.154	0.989	9,465

Data were obtained from Tables 6-7, p. 33 and Appendix 7, pp. 96-105 of the study report.
[1] Desorption values reported for fifth desorption step.
K_d -Adsorption and desorption coefficients; K - Freundlich adsorption and desorption coefficients; 1/N -Slope of Freundlich adsorption/desorption isotherms.
K_{oc} - Coefficient adsorption per organic carbon (K_d or K x 100/% organic carbon).
R^2 - Regression coefficient of Freundlich equation.

2. RPA 221701 has medium to high mobility, based on K_{oc} values of 101 to 266 (mean 189) for the four test soils and sediment (p. 28). A slightly nonlinear relationship was observed between the concentration of RPA 221701 adsorbed and the concentration of RPA 221701 in solution for all the test soils and sediment. Slight concentration effects occurred at lower test concentrations. For the four test soils and sediment, adsorption was not fully reversible, with hysteresis in the adsorption/desorption curve (p. 27). Desorption K values increased with each desorption step, indicating that RPA 221701 becomes more difficult to desorb with each desorption step (see table below). The study authors added that at low test concentrations, RPA 221701 may be less mobile than predicted from the adsorption isotherms. The study authors also concluded that, under field conditions, RPA 221701 would have much lower actual mobility than that predicted by the adsorption values calculated for this study. The reviewer noted similar behavior for the mobility of fenamidone and other fenamidone transformation products (MRID 45930003, reviewed in this submission; MRIDs 45385823, -24, -25, -26, and -27, reviewed in previous submission).

Freundlich desorption constants of [^{14}C]RPA 221701 in soils and sediment following five desorption steps.[1]

Serial desorption of RPA 221701				
Desorption step	**K_d**	**1/N**	**R^2**	**K_{oc}**
Silt loam 96/19 soil				
First	3.66	0.984	0.991	732
Second	13.67	1.060	0.985	2734
Third	47.09	1.136	0.981	9417
Fourth	129.78	1.190	0.982	25956
Fifth	402.76	1.280	0.981	80551

Serial desorption of RPA 221701				
Desorption step	K_d	**1/N**	R^2	K_{oc}
Loam 98/26 soil				
First	5.19	0.878	0.998	326
Second	8.63	0.894	0.997	454
Third	11.53	0.905	0.995	607
Fourth	15.64	0.910	0.994	823
Fifth	21.28	0.931	0.992	1120
Silt loam 97/10 soil				
First	2.96	0.816	0.985	156
Second	4.73	0.823	0.968	249
Third	6.88	0.818	0.941	362
Fourth	9.86	0.821	0.912	519
Fifth	13.21	0.829	0.881	695
Clay 97/17 sediment				
First	7.05	0.952	0.999	207
Second	10.25	0.977	0.997	302
Third	14.95	1.000	0.995	440
Fourth	21.18	1.010	0.995	623
Fifth	30.36	1.031	0.994	893
Sandy loam 98/32 soil				
First	4.49	0.962	0.996	374
Second	9.88	1.009	0.993	823
Third	22.39	1.054	0.991	1866
Fourth	47.23	1.087	0.990	3936
Fifth	113.58	1.154	0.989	9465

[1] Data were obtained from Tables 13-17, pp. 36-45 of the study report.

3. According to the McCall et. al. classification system, RPA 221701 had medium to highly mobile in the silt loam 96/19 soil, loam 98/26 soil, silt loam 97/10 soil, clay 97/17 sediment,

and sandy loam 98/32 soil (p. 25; Table 24, p. 48).

4. The 1/n values associated with the adsorption K for the loam 98/26 soil and silt loam 97/10 soil were below 0.9 (1/n = 0.874 and 0.827, respectively; Table 6, p. 33). The 1/n values associated with desorption K were below 0.9 for the silt loam 97/10 soil (1/n = 0.829) and were above 1.1 for the silt loam 96/19 soil and sandy loam 98/32 soil (1/n = 1.280 and 1.154, respectively; Table 7, p. 33). If the 1/n value is not within the range of 0.9 to 1.1, then the Freundlich isotherm may not adequately or accurately represent adsorption of the compound across all concentrations.

5. The amount of RPA 221701 (μg) adsorbed to the soils and sediment was calculated as the difference between the amount applied and the amount in the supernatant solution (pp. 24, 26). Allowances were made for RPA 221701 in the residual water following the adsorption and desorption steps.

6. The test substance was incompletely characterized; physical descriptions were not reported. The physico-chemical properties of RPA 221701 were incomplete; vapour pressure, UV adsorption, melting point, bulk density, pK_a, K_{ow}, and the stability of the test substance was not reported.

7. Three of the five test soils (loam 98/26 soil, silt loam 97/10 soil and clay 97/17 sediment) were foreign in origin (Table 1, p. 30). However, these test soils were characterized using the USDA classification system and were comparable to U.S. soils.

8. The test soils were incompletely described; the bulk density and the soil biomass were not reported.

9. A complete description of the test soil collection and storage was not provided; pesticide use history at the collection site, collection procedures, sampling depth, storage conditions, and storage length were not reported.

10. The concentration of the co-solvent, acetonitrile, in the test solutions used in the definitive study was not reported. The available data were insufficient for the reviewer to calculate the acetonitrile concentration in the test solutions.

11. The concentration in solution following the fourth desorption phase for the loam 98/26 soil treated at a nominal concentration of 0.4 mg a.i./kg was inconsistent with the other test concentrations (p. 26; Table 14, p. 39). The study authors stated that this was probably because the tubes were not shaken prior to retuning to the shaker for the fourth desorption phase; these samples were excluded from the study authors' Freundlich value calculations for the loam 98/26 soil. The authors did not consider the exclusion of these data in the calculation to significantly affect the study results.

12. The definitive study temperature was reported as 20 ± 1°C. More detailed information was not provided. It is preferred that minimum, maximum, and average temperatures be reported. Any significant deviations from the average and their duration should be noted.

13. Control samples were not employed in the definitive study.

14. Storage intervals and conditions were not reported. Based on the information provided in study report Table 2, the high-dose adsorption and desorption supernatants were stored for 1-2 days prior to HPLC analysis (p. 31). Storage stability data were not reported.

15. Limits of quantification for LSC and HPLC analyses were not reported. Both method detection limits and limits of quantitation should be reported to allow the reviewer to evaluate the adequacy of the method. Combustion efficiency was not reported.

16. Graphical representations of the Freundlich isotherms for RPA 221701 adsorption/desorption of the five test soils are presented in Figure 3, p. 51 and Figures 5-9, pp. 52-54 of the study report.

V. REFERENCES:

1. U.S. Environmental Protection Agency. 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate, Section 163-1. Mobility studies. Office of Pesticide and Toxic Substances, Washington, DC. EPA 540/9-82-021.

2. U.S. Environmental Protection Agency. 1989. FIFRA Accelerated Reregistration, Phase 3 Technical Guidance. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 540/09-90-078.

3. U.S. Environmental Protection Agency. 1993. Pesticide Registration Rejection Rate Analysis - Environmental Fate. Office of the Prevention, Pesticides, and Toxic Substances, Washington, DC. EPA 738.

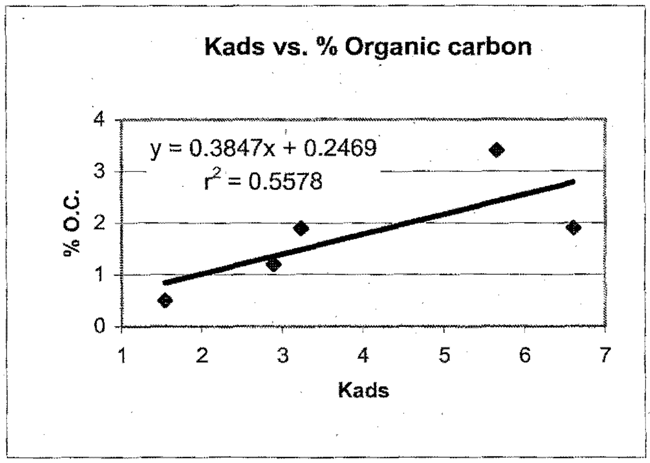
4. U.S. Environmental Protection Agency. 2003. Guidance for Calculating Sorption Coefficients in Batch Equilibrium Studies.

Attachment 1

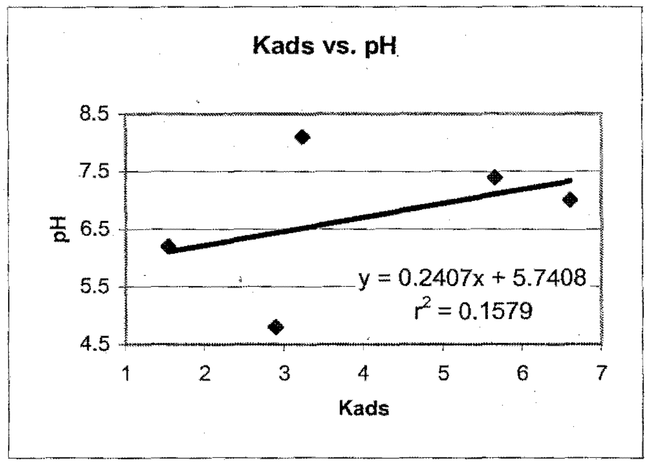
Excel Spreadsheets

Chemical: RPA 21701 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

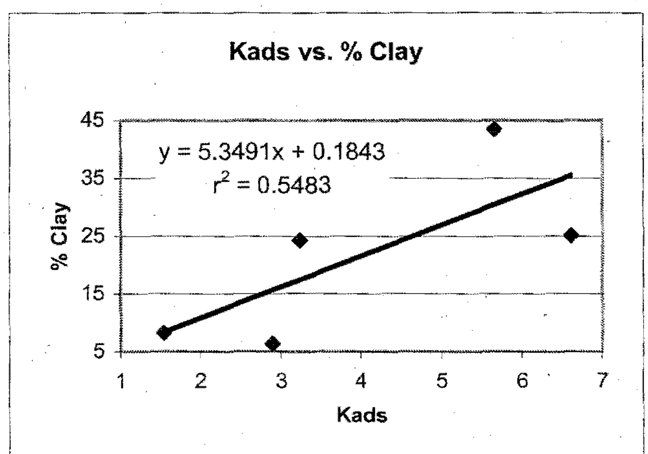
Soil	Kads	% organic carbon
Silt loam	1.5363	0.5
Loam	6.6045	1.9
Silt loam	3.2271	1.9
Clay	5.6634	3.4
Sandy loam	2.8934	1.2



Soil	Kads	pH
Silt loam	1.5363	6.2
Loam	6.6045	7
Silt loam	3.2271	8.1
Clay	5.6634	7.4
Sandy loam	2.8934	4.8



Soil	Kads	% clay
Silt loam	1.5363	8.23
Loam	6.6045	25.12
Silt loam	3.2271	24.31
Clay	5.6634	43.49
Sandy loam	2.8934	6.35



Data were obtained from p. 21; Table 1, p. 30; Table 5, p. 32; Tables 8-12, pp. 34-35; and Appendices 5-7, pp. 83-105 of the study report. The Kads was determined by the reviewer using the following equation: Kd= [(CoVo) - (Ceq)Vo)/m]/Ceq.

Chemical: RPA 221701 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Silt loam 96/19- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_{o)}-(C_{eq}V_{o)}]$/soil mass	Kd	
2.2689	75	1.80752	75	15	2.3069	1.2763	
2.2689	75	1.81741	75	15	2.2575	1.2421	
0.4624	75	0.34573	75	15	0.5834	1.6873	
0.4624	75	0.34714	75	15	0.5763	1.6601	
0.0698	75	0.05342	75	15	0.0819	1.5331	
0.0698	75	0.05345	75	15	0.0818	1.5295	
0.0192	75	0.01445	75	15	0.0238	1.6436	
0.0192	75	0.01429	75	15	0.0246	1.7180	
						1.5363	AVG

Loam 98/26- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_{o)}-(C_{eq}V_{o)}]$/soil mass	Kd	
2.2689	75	1.23731	75	15	5.1580	4.1687	
2.2689	75	1.20075	75	15	5.3408	4.4478	
0.4624	75	0.20324	75	15	1.2958	6.3757	
0.4624	75	0.20666	75	15	1.2787	6.1875	
0.0698	75	0.02797	75	15	0.2092	7.4777	
0.0698	75	0.02749	75	15	0.2116	7.6955	
0.0192	75	0.00722	75	15	0.0599	8.2964	
0.0192	75	0.00728	75	15	0.0596	8.1868	
						6.6045	AVG

Silt loam 97/10- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_{o)}-(C_{eq}V_{o)}]$/soil mass	Kd	
2.2689	75	1.72013	75	15	2.7439	1.5951	
2.2689	75	1.61991	75	15	3.2450	2.0032	
0.4624	75	0.28104	75	15	0.9068	3.2266	
0.4624	75	0.28052	75	15	0.9094	3.2418	
0.0698	75	0.04075	75	15	0.1453	3.5644	
0.0698	75	0.04144	75	15	0.1418	3.4218	
0.0192	75	0.01008	75	15	0.0456	4.5238	
0.0192	75	0.01039	75	15	0.0441	4.2397	
						3.2271	AVG

Data were obtained from p. 21; Table 5, p. 32; and Tables 8-12, pp. 34-35 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Clay 97/17- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.2689	75	1.16611	75	15	5.5140	4.7285	
2.2689	75	1.1721	75	15	5.4840	4.6788	
0.4624	75	0.21205	75	15	1.2518	5.9031	
0.4624	75	0.21464	75	15	1.2388	5.7715	
0.0698	75	0.03213	75	15	0.1884	5.8621	
0.0698	75	0.03231	75	15	0.1875	5.8016	
0.0192	75	0.00851	75	15	0.0535	6.2808	
0.0192	75	0.00851	75	15	0.0535	6.2808	
						5.6634	AVG

Sandy loam 98/32- Adsorption

Initial soln concen (C_o)	Volume of soln (V_o)	Concen in soln after equil (C_{eq})	Volume of soln (V_o)	Dry mass of sorbent (m)	$[(C_oV_o)-(C_{eq}V_o)]$/soil mass	Kd	
2.2689	75	1.53071	75	15	3.6910	2.4113	
2.2689	75	1.53125	75	15	3.6883	2.4087	
0.4624	75	0.29045	75	15	0.8598	2.9601	
0.4624	75	0.28882	75	15	0.8679	3.0050	
0.0698	75	0.04406	75	15	0.1287	2.9210	
0.0698	75	0.04373	75	15	0.1304	2.9808	
0.0192	75	0.01176	75	15	0.0372	3.1633	
0.0192	75	0.01157	75	15	0.0382	3.2973	
						2.8934	AVG

Data were obtained from p. 21; Table 5, p. 32; and Tables 8-12, pp. 34-35 of the study report.

Chemical: RPA 221701 (metabolite of fenamidone)
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 4/6 Adsorption soil

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	2.1594	4.95629	2.33901	5.28792	3.41907
2.2	2.20991	5.13468	2.8991	5.35911	3.47598
AVG	2.1847	5.0455	2.6191	5.3235	3.4475
STDEV	0.04	0.13	0.40	0.05	0.04
0.4	0.54646	1.25187	0.81175	1.20594	0.79853
0.4	0.55003	1.21549	0.82079	1.19629	0.8139
AVG	0.5482	1.2337	0.8163	1.2011	0.8062
STDEV	0.00	0.03	0.01	0.01	0.01
0.08	0.07838	0.19839	0.13127	0.18213	0.12474
0.08	0.07834	0.20376	0.13201	0.18354	0.1259
AVG	0.0784	0.2011	0.1316	0.1828	0.1253
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.02241	0.05734	0.04245	0.05148	0.03624
0.02	0.02394	0.05872	0.04068	0.05167	0.03622
AVG	0.0232	0.0580	0.0416	0.0516	0.0362
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 8-12, pp. 34-35 of the study report.

Table 5 Adsorption supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	73.53	48.91	69.96	44.29	63.34
2.2	74.48	47.29	65.99	44.66	63.42
0.4	68.37	39.42	55.86	39.47	58.72
0.4	69.04	40.03	55.72	39.95	58.57
0.08	70.64	35.77	53.5	39.52	58.91
0.08	70.45	35.27	54.5	39.87	58.52
0.02	69.13	34.07	47.97	38.06	57.33
0.02	68.54	33.7	49.71	38.11	56.52
AVG	70.52	39.31	56.65	40.49	59.42
STDEV	2.31	5.91	7.60	2.57	2.58

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 5 Desorption 1 supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	15.01	19.16	18.54	21.72	18.73
2.2	14.85	21.37	18.36	21.35	18.57
0.4	14.8	19.74	18.3	20.44	18.15
0.4	14.14	19.76	17.95	20.01	17.74
0.08	16.14	19.66	19.88	20.15	19.65
0.08	16.29	19.65	19	21.03	19.61
0.02	16.33	18.49	18.33	20.64	19.46
0.02	16.04	18.39	18.55	20.73	19.69
AVG	15.45	19.53	18.61	20.76	18.95
STDEV	0.84	0.93	0.59	0.58	0.76

Table 5 Desorption 2 supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	3.67	11.1	6.03	10.79	6.33
2.2	3.33	9.75	5.93	10.56	6.2
0.4	4.1	10.17	6.69	10.67	6.5
0.4	3.8	10.3	6.64	10.49	6.49
0.08	4.73	11.21	8.13	11.67	7.78
0.08	4.94	11.14	8	11.93	7.68
0.02	5.07	10.65	8.26	11.54	7.78
0.02	4.95	10.63	7.87	11.44	7.97
AVG	4.32	10.62	7.19	11.14	7.09
STDEV	0.68	0.52	0.97	0.57	0.77

Table 5 Desorption 3 supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	1.29	5.9	2.53	5.99	2.56
2.2	1.16	5.44	2.43	5.78	2.55
0.4	1.56	5.61	2.96	6.02	2.88
0.4	1.48	5.86	2.93	5.92	2.79
0.08	1.96	6.85	3.84	6.96	3.59
0.08	2.08	6.9	3.92	6.89	3.38
0.02	2.15	6.7	4.21	7.07	3.65
0.02	2.1	6.73	4.13	6.99	3.76
AVG	1.72	6.25	3.37	6.45	3.15
STDEV	0.40	0.60	0.73	0.57	0.50

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 5 Desorption 4 supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	0.58	3.4	1.24	3.58	1.28
2.2	0.53	3.16	1.13	3.46	1.26
0.4	0.77	3.62	1.57	3.73	1.49
0.4	0.79	3.63	1.54	3.74	1.46
0.08	1.03	0.28	2.24	4.34	1.65
0.08	1.02	0.36	2.14	4.28	2.04
0.02	1.08	4.33	2.48	4.38	1.92
0.02	1.07	4.5	2.41	4.31	1.98
AVG	0.86	2.91	1.84	3.98	1.64
STDEV	0.22	1.66	0.54	0.39	0.31

Table 5 Desorption 5 supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	0.32	2.14	0.66	2.25	0.67
2.2	0.29	2.02	0.63	2.24	0.68
0.4	0.47	2.44	0.95	2.46	0.85
0.4	0.45	2.45	0.96	2.45	0.85
0.08	0.67	4.67	1.37	2.81	1.15
0.08	0.65	4.49	1.38	2.72	1.06
0.02	0.72	3.27	1.71	2.94	1.22
0.02	0.75	3.27	1.66	2.99	1.27
AVG	0.54	3.09	1.17	2.61	0.97
STDEV	0.18	1.03	0.42	0.30	0.24

Table 5 Extracted

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	0.97	7.23	1.97	7.32	2.47
2.2	0.94	5.79	1.88	7.4	2.52
0.4	-	-	-	-	-
0.4	-	-	-	-	-
0.08	-	-	-	-	-
0.08	-	-	-	-	-
0.02	-	-	-	-	-
0.02	-	-	-	-	-
AVG	0.96	6.51	1.93	7.36	2.50
STDEV	0.02	1.02	0.06	0.06	0.04

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 5 Combusted

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	1.08	3.23	2.67	2.91	1.42
2.2	1.01	3.17	2.71	2.83	1.45
0.4	2.89	12.18	6.28	10.55	8.57
0.4	1.98	12.23	5.59	10.84	4.65
0.08	4.48	18.47	11.14	12.82	6.59
0.08	4.56	21.11	10.63	12.59	6.39
0.02	5.01	20.7	13.83	13.08	7.09
0.02	5.27	20.58	12.88	13.3	7.41
AVG	3.29	13.96	8.22	9.87	5.45
STDEV	1.77	7.54	4.46	4.43	2.71

Table 5 Recovery

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	96.46	101.08	103.65	98.85	96.8
2.2	96.59	97.99	99.06	98.27	96.65
0.4	92.95	93.19	92.61	93.34	97.15
0.4	91.69	94.25	91.34	93.41	92.54
0.08	99.65	96.91	100.11	98.27	99.31
0.08	99.98	98.92	99.56	99.3	98.69
0.02	99.48	98.21	96.8	97.72	98.46
0.02	98.72	97.8	97.2	97.88	98.61
AVG	96.94	97.29	97.54	97.13	97.28
STDEV	3.16	2.53	4.03	2.37	2.15

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

Table 6 Adsorption supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	1.80752	1.23731	1.72013	1.16611	1.53071
2.2	1.81741	1.20075	1.61991	1.1721	1.53125
AVG	1.8125	1.2190	1.6700	1.1691	1.5310
STDEV	0.01	0.03	0.07	0.00	0.00
0.4	0.34573	0.20324	0.28104	0.21205	0.29045
0.4	0.34714	0.20666	0.28052	0.21464	0.28882
AVG	0.3464	0.2050	0.2808	0.2133	0.2896
STDEV	0.00	0.00	0.00	0.00	0.00
0.08	0.05342	0.02797	0.04075	0.03213	0.04406
0.08	0.05345	0.02749	0.04144	0.03231	0.04373
AVG	0.0534	0.0277	0.0411	0.0322	0.0439
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.01445	0.00722	0.01008	0.00851	0.01176
0.02	0.01429	0.00728	0.01039	0.00851	0.01157
AVG	0.0144	0.0073	0.0102	0.0085	0.0117
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 8-12, pp. 34-35 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 6 % Adsorption

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	19.63	45.06	21.26	48.07	31.08
2.2	20.09	46.68	26.36	48.72	31.6
AVG	19.86	45.87	23.81	48.40	31.34
STDEV	0.33	1.15	3.61	0.46	0.37
0.4	27.32	62.59	40.59	60.3	39.93
0.4	27.5	60.77	41.04	59.81	40.7
AVG	27.41	61.68	40.82	60.06	40.32
STDEV	0.13	1.29	0.32	0.35	0.54
0.08	19.6	49.6	32.82	45.53	31.18
0.08	19.58	50.94	33	45.88	31.48
AVG	19.59	50.27	32.91	45.71	31.33
STDEV	0.01	0.95	0.13	0.25	0.21
0.02	22.41	57.34	42.45	51.48	36.24
0.02	23.94	58.72	40.68	51.67	36.22
AVG	23.1750	58.0300	41.5650	51.5750	36.2300
STDEV	1.08	0.98	1.25	0.13	0.01

Table 7 Desorption soil

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	0.61357	1.01307	0.10672	1.21928	0.77114
2.2	0.61658	1.18772	0.61276	1.30804	0.81063
AVG	0.6151	1.1004	0.3597	1.2637	0.7909
STDEV	0.00	0.12	0.36	0.06	0.03
0.4	0.21816	0.4229	0.29913	0.37978	0.25255
0.4	0.23098	0.39371	0.31434	0.38599	0.27014
AVG	0.2246	0.4083	0.3067	0.3829	0.2613
STDEV	0.01	0.02	0.01	0.00	0.01
0.08	0.01647	0.07015	0.03625	0.04817	0.02512
0.08	0.0156	0.07346	0.03753	0.04452	0.02651
AVG	0.0160	0.0718	0.0369	0.0463	0.0258
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.00508	0.02061	0.0156	0.01391	0.00821
0.02	0.00621	0.02124	0.01437	0.01403	0.00815
AVG	0.0056	0.0209	0.0150	0.0140	0.0082
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 13-17, pp. 36-45 of the study report.

Chemical: RPA 221701
PC Code: 046679
MRID: 45930002
Guideline No: 163-1

Table 7 Desorption supernatant

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	0.00735	0.04974	0.01508	0.0516	0.01552
2.2	0.00671	0.04656	0.01465	0.05218	0.01558
AVG	0.0070	0.0482	0.0149	0.0519	0.0156
STDEV	0.00	0.00	0.00	0.00	0.00
0.4	0.00214	0.01143	0.00439	0.0115	0.00395
0.4	0.00223	0.01141	0.00446	0.01153	0.00396
AVG	0.0022	0.0114	0.0044	0.0115	0.0040
STDEV	0.00	0.00	0.00	0.00	0.00
0.08	0.00048	0.00328	0.00103	0.00201	0.00083
0.08	0.00047	0.00321	0.00099	0.00198	0.00076
AVG	0.0005	0.0032	0.0010	0.0020	0.0008
STDEV	0.00	0.00	0.00	0.00	0.00
0.02	0.00014	0.00063	0.00033	0.0006	0.00026
0.02	0.00015	0.00064	0.00032	0.00058	0.00025
AVG	0.0001	0.0006	0.0003	0.0006	0.0003
STDEV	0.00	0.00	0.00	0.00	0.00

Data were obtained from Tables 13-17, pp. 36-45 of the study report.

Table 7 % desorbed as % of the adsorbed

	Silt loam	Loam	Silt loam	Clay	Sandy loam
2.2	91.02	79.93	86.08	81.25	88.37
2.2	91.18	82.33	86.12	80.94	88.05
AVG	91.10	81.13	86.10	81.10	88.21
STDEV	0.11	1.70	0.03	0.22	0.23
0.4	88.28	77.33	82.91	80.42	77.73
0.4	91.21	77.46	84.28	79.7	86.34
AVG	89.75	77.40	83.60	80.06	82.04
STDEV	2.07	0.09	0.97	0.51	6.09
0.08	84.56	69.79	76.08	78.18	83.71
0.08	84.59	66.83	76.43	78.83	84.07
AVG	84.58	68.31	76.26	78.51	83.89
STDEV	0.02	2.09	0.25	0.46	0.25
0.02	83.52	67.73	71.66	78.06	82.74
0.02	82.54	67.89	72.9	77.73	82.37
AVG	83.03	67.81	72.28	77.90	82.56
STDEV	0.69	0.11	0.88	0.23	0.26

Data were obtained from Tables 19-23, pp. 47-48 of the study report.

Attachment 2

Structures of Parent and Transformation Products

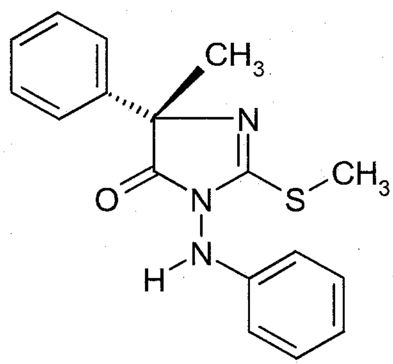
RPA 407213

IUPAC name: (*S*)-5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one
(*S*)-4-Methyl-2-methylthio-4-phenyl-1-phenylamino-5(4H)-imidazolone

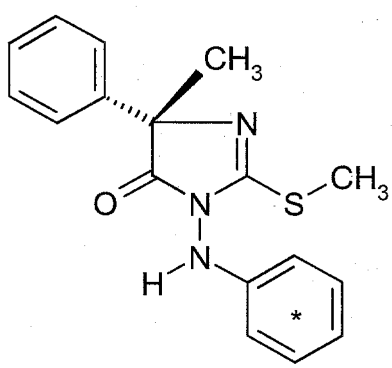
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-, (S)-

CAS #: 161326-34-7

Unlabeled

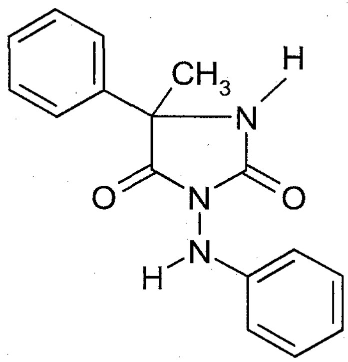


With radiolabel



*Position of [^{14}C]-radiolabel.

RPA 405862
IUPAC name: 5-Methyl-5-phenyl-3-phenylaminoimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-5-phenyl-3-(phenylamino)-
CAS #: 153969-11-0

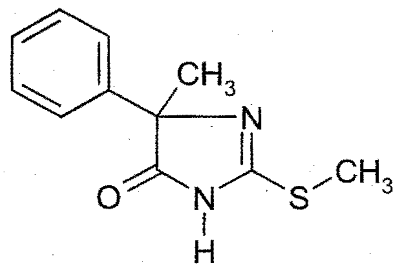


RPA 408056

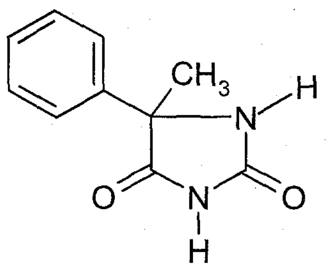
IUPAC name: 5-Methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one
4-Methyl-2-methylthio-4-phenyl-2-imidazolin-5-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-

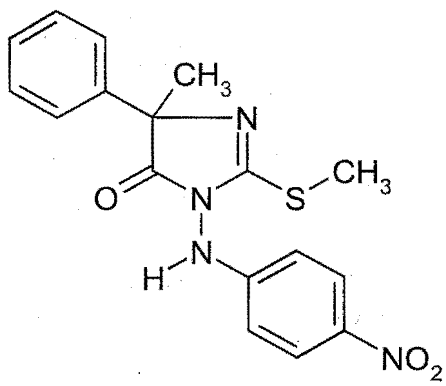
CAS #: N/A



RPA 717879
IUPAC name: 5-Methyl-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-5-phenyl-
CAS #: 6843-49-8



RPA 406012
IUPAC name: 5-Methyl-2-methylthio-3-(4-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-[(4-nitrophenyl)amino]-5-phenyl-
CAS #: 151022-56-9
451022-66-9

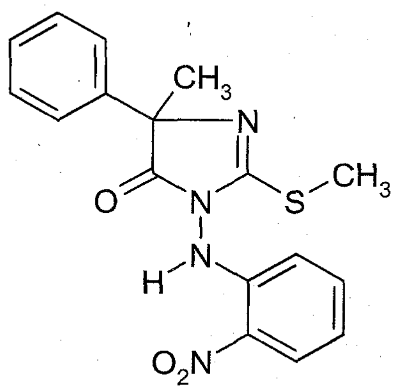


RPA 410914

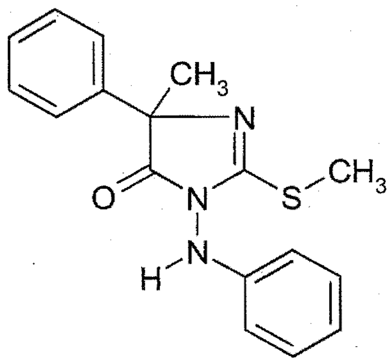
IUPAC name: 5-Methyl-2-methylthio-3-(2-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one (4RS)-4-methyl-2-methylthio-(1H)-1-(2-nitrophenylamino)-4-phenyl-2-imidazolin-5-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-(2-nitrophenylamino)-5-phenyl-

CAS #: N/A

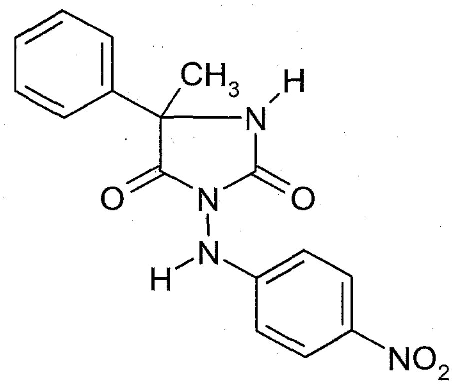


RPA 405803
IUPAC name: 5-Methyl-2-methylthio-5-phenyl-3-phenylamino-3,5-dihydroimidazol-4-one
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-3-(phenylamino)-
CAS #: 151022-37-6

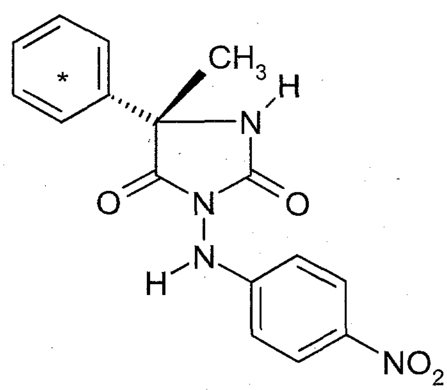


RPA 409446
IUPAC name: 5-Methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-(4-nitrophenylamino)-5-phenyl-
CAS #: N/A

Unlabeled

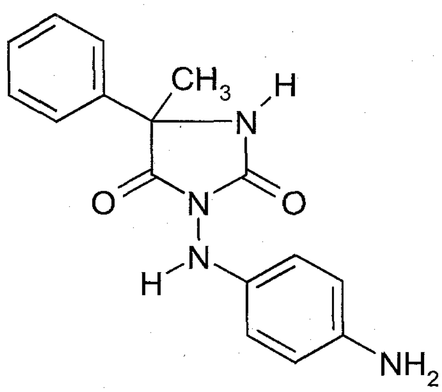


With radiolabel



*Position of [^{14}C]-radiolabel.

RPA 409445
IUPAC name: 3-(4-Aminophenylamino)-5-methyl-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 3-(4-aminophenylamino)-5-methyl-5-phenyl-
CAS #: N/A

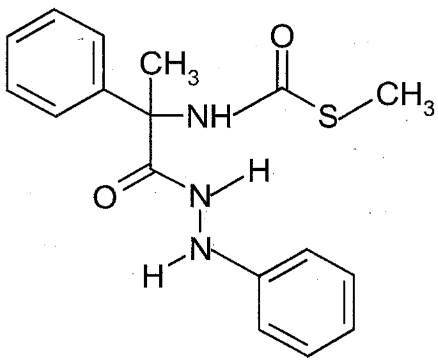


RPA 407599

IUPAC name: [1-Phenyl-1-(N'-phenylhydrazinocarbonyl)-ethyl]-thiocarbamic acid S-methyl ester

CAS name: Benezeneacetic acid, α-methyl-N-thiocarboxy-, S-methyl ester, 2-phenylhydrazide

CAS #: N/A

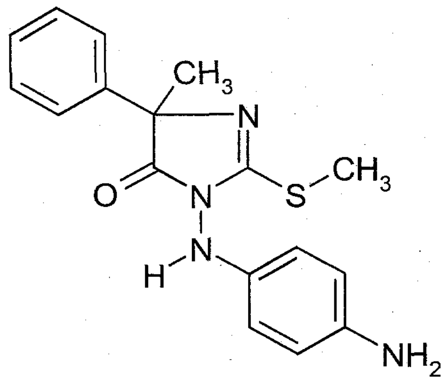


RPA 409352

IUPAC name: 3-(4-Aminophenylamino)-5-methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-3-(4-aminophenylamino)-5-methyl-2-(methylthio)-5-phenyl-

CAS #: N/A

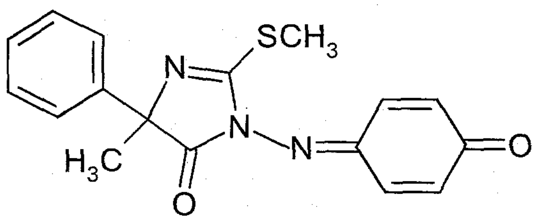


RPA 418915

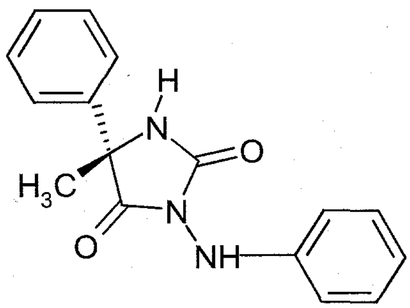
IUPAC name: (*S*)-5-Methyl-2-methylthio-3-[4-oxo-2,5-cyclohexadien-1-ylidene)amino]-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: N/A

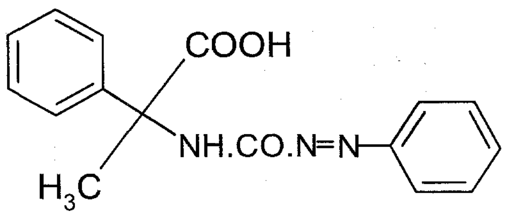
CAS #: N/A



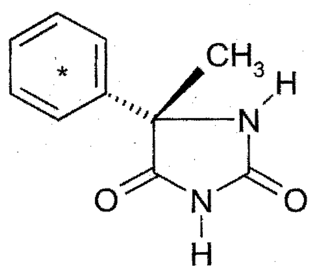
RPA 410193
IUPAC name: (*S*)-4-Methyl-4-phenyl-1-phenylaminoimidazolidin-2,5-dione
CAS name: N/A
CAS #: N/A



RPA 409344
IUPAC name: (R,S)-2-methyl-2-phenyl-N-(phenylazocarbonyl)glycine
(R,S)-2-phenyl-2-(phenylazocarbonylamino)propionic acid
CAS name: N/A
CAS #: N/A



RPA 412636
IUPAC name: (*S*)-5-Methyl-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione,5-methyl-5-phenyl-, (S)
CAS #: 27539-12-4



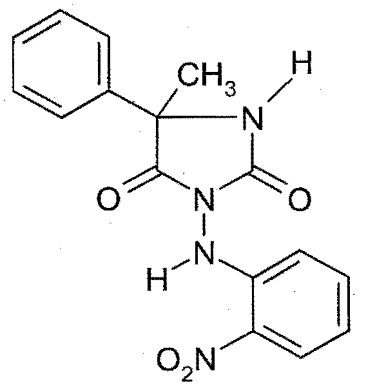
* Position of [^{14}C] radiolabel.

RPA 410995

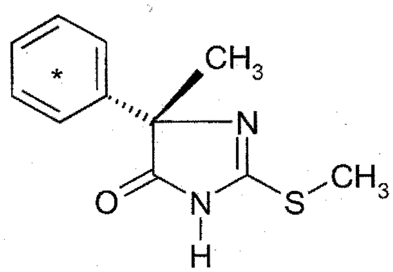
IUPAC name: 5-Methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione

CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-

CAS #: N/A



RPA 412708
IUPAC name: (*S*)-5-Methyl-2-methylthio-5-phenyl-3,5-dihydroimidazol-4-one
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-5-phenyl-,(S)-
CAS #: N/A

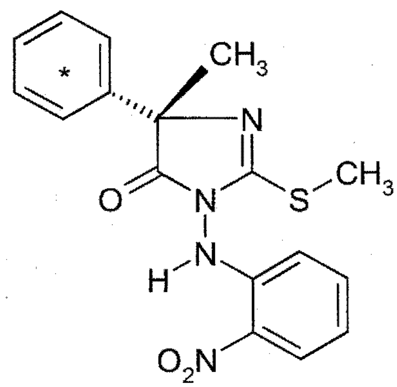


RPA 413255

IUPAC name: (*S*)-5-Methyl-2-methylthio-3-(2-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one

CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-(2-nitrophenylamino)-5-phenyl-,(S)-

CAS #: N/A



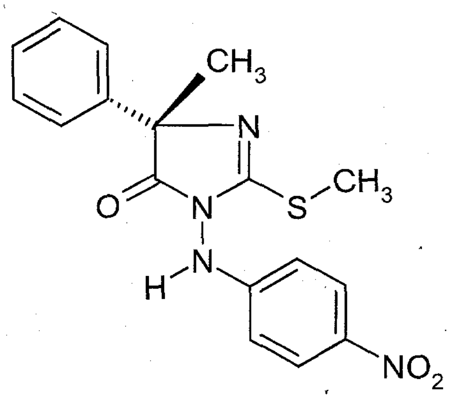
* Position of [^{14}C] radiolabel.

RPA 411639

IUPAC name: (*S*)-5-Methyl-2-methylthio-3-(4-nitrophenylamino)-5-phenyl-3,5-dihydroimidazol-4-one

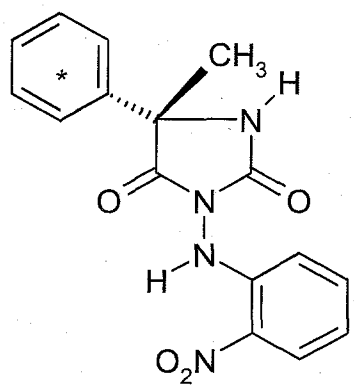
CAS name: 4*H*-Imidazol-4-one, 3,5-dihydro-5-methyl-2-(methylthio)-3-[(4-nitrophenyl)amino)-5-phenyl-,(S)-

CAS #: N/A



RPA 221701

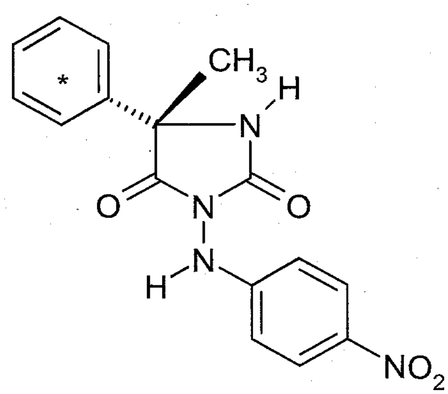
IUPAC name: (S)-5-Methyl-3-(2-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-, (S)-
CAS #: N/A



*Position of [^{14}C]-radiolabel.

RPA 221607

IUPAC name: (S)-5-Methyl-3-(4-nitrophenylamino)-5-phenylimidazolidine-2,4-dione
CAS name: 2,4-Imidazolidinedione, 5-methyl-3-[(2-nitrophenyl)amino]-5-phenyl-, (S)-
CAS #: N/A



*Position of [^{14}C]-radiolabel.